Two novel characterizations of self-decomposable Bernstein functions are provided. The first one is purely analytic, stating that a function $\Psi$ is the Bernstein function of a self-decomposable probability law $\pi$ on the positive half-axis if and only if alternating sums of $\Psi$ satisfy certain monotonicity conditions. The second characterization is of probabilistic nature, showing that $\Psi$ is a self-decomposable Bernstein function if and only if a related d-variate function $C_{\psi,d}$, $\psi:=\exp(-\psi)$, is a d-variate copula for each $d \geq 2$. A canonical stochastic construction is presented, in which $\pi$ (respectively $\Psi$) determines the probability law of an exchangeable sequence of random variables $\{U_k\}_{k \in \mathbb{N}}$ such that $(U_1, \ldots, U_d) \sim C_{\psi,d}$ for each $d \geq 2$. The random variables $\{U_k\}_{k \in \mathbb{N}}$, are i.i.d. conditioned on an increasing Sato process whose law is characterized by $\Psi$. The probability law of $\{U_k\}_{k \in \mathbb{N}}$ is studied in quite some detail.

Stichwörter: Self-decomposability, Sato process, Copula, Complete monotonicity

Intellectual Contribution: Discipline-based Research

Zeitschriftentitel: Journal of Theoretical Probability

Jahr: 2017

Band: